



Accomplishing Forest Stewardship with Hand-Applied Herbicides

Accomplishing forest stewardship requires many tools. Hand-applied herbicide technologies are varied and effective tools which allow the landowner to selectively control vegetation in a variety of circumstances.

Selective vegetation control can accomplish several stewardship objectives:

- Favor mast-producing trees and shrubs for wildlife food
- Favor trees with desirable fall color, shape, or form to enhance aesthetics
- Control unwanted brush along forest trails, or open up roads to daylight
- Remove overstory to increase ground-level sunlight for planting wildlife food plots
- Favor commercial timber species while selectively controlling undesirable trees and shrubs
- Control herbaceous weeds and grasses that compete with desirable woody vegetation
- Create snags for wildlife habitat

Hand-applied herbicides fit the bill where convenience, environmental concern, lack of timber markets, or smoke restrictions prohibit the landowner from using more traditional methods of vegetation control. Hand-applied herbicide methods are simple, safe, and inexpensive. They allow landowners to practice timber, wildlife, and recreation management with a minimum investment in equipment.

A number of herbicides are labeled for individual stem treatment (see Table 1). Consultation with the county Extension agent, state forest service forester, forestry consultant, or weed control specialist can assist in selecting the

Table 1. Herbicides Labeled for Individual Stem Treatments

HERBICIDE	BRAND NAMES	TYPE OF APPLICATION				
		foliar	cut surface			basal
			frill	stump	inject	
2,4-D	Many names	X	X	X	X	X
Dicamba	Banvel	X	X	X	X	X
Dichlorprop	2,4-DP, Weedone 2,4-DP	X	X	X	X	X
		X	X	X	X	X
Fosamine	Krenite	X				
Glyphosphate	Accord	X		X	X	
Imazapyr	Arsenal, Chopper	X	X	X		
Picloram	Tordon, Pathway	X	X	X	X	X
Triclopyr	Garlon 3A, Garlon 4 Pathfinder	X	X	X	X	X

Note: All formulations of these herbicides are not suitable for all the uses indicated. Check manufacturer's label for uses and additional precautions. Follow label instructions.

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herbicide, formulation, and application technique suitable to achieve a specific objective.

Note: These recommendations are not intended for growers of Christmas trees and woody ornamentals. Those growers should refer to material specifically suited to their purposes.

The following chart lists the advantages and disadvantages of individual stem and application techniques.

Advantages And Disadvantages Of Hand Application Of Herbicides

Advantages

- has low cost
- is efficient use of herbicide/acre
- allows for selective application
- is useful in areas where heavy equipment use may be inappropriate
- is less likely to cause soil disturbance
- can be used where prescribed burning cannot
- is suitable for small tracts

Disadvantages

- requires special equipment
- requires special knowledge and experience
- has undesirable effects if label recommendations are not followed
- is labor intensive

Hand Application Methods

Three methods of hand application are generally recognized.

Basal Stem (bark) Treatment. Herbicide solution is applied to the outer bark at or near the ground line. Included are full basal and streamline (thinline) basal.

Cut Surface. Herbicide solution is applied to a fresh-cut stump or to a cut surface on a standing stem. Included are tree injection, hack and squirt, frill and spray, and fresh-cut stump treatment.

Directed Foliar. Herbicide is sprayed on the foliage of unwanted brush with care taken to avoid application to desirable stems.

Application Equipment

For basal bark and directed foliar techniques, a backpack sprayer with a diaphragm pump is preferred. Piston pumps are also used, but diaphragm pump units operate at lower pressures and are less prone to leak. Normal pumping of a diaphragm unit maintains the 20-40 psi (pounds per square inch) pressure recommended for hand applications. Specific recommendations for nozzle sizes and specialized nozzles will be discussed as they apply to application method.

For the cut surface application method, a simple spray bottle should suffice if treating a small number of freshly cut stumps or for delivering herbicide to frills or hacks made with a hand ax or hatchet. Tree injectors, which wound the stem and then deliver a measured dose of herbicide, are available at minimal cost to control standing stems.

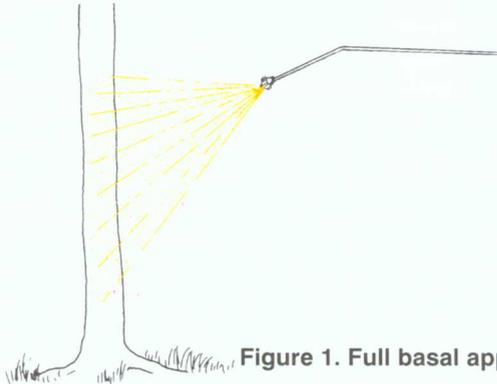


Figure 1. Full basal application

Basal Stem (bark) Methods

Full Basal. Apply herbicide to the lower 12 to 20 inches of the stem. Full basal works best on stems 6 inches or less in diameter and requires that the stem be completely wet with herbicide solution on all sides. A narrow angle, flat-fan spray nozzle or adjustable spray tip works well. Full basal treatments are usually done during the dormant season although some herbicides work equally well when leaves are present.

Streamline Or Thinline Basal. Streamline basal is most effective on juvenile, thin-barked stems up to 2 inches in diameter. A 2- to 3-inch band of spray is applied to one side of the stem from 6 to 24 inches



Figure 2. Streamline (or thinline) basal application

above ground level. Correctly done, the herbicide solution will encircle the stem at the point of impact and run down the stem 6 to 10 inches which increases the surface area for absorption.

A diaphragm pump backpack unit equipped with a specialized "gunjet" works best. The gunjet is tipped with a TP 0001 or DE-1 disk or a TP0002 or D-2 for more experienced applicators.

Cut Surface Methods

Cut surface treatments include frill and spray, fresh-cut stump, hack and squirt, and tree injection. As the name implies, each method involves cutting or severing the stem and applying a dose of herbicide or herbicide solution to the cut surface. Cut surface treatments are effective from mid-February through most of the growing season. December through January is generally less effective. Periods of heavy sap flow or prolonged drought have resulted in reduced effectiveness. Some herbicides work better during specific time periods. Labeling of most herbicides gives information on optimum application timing.

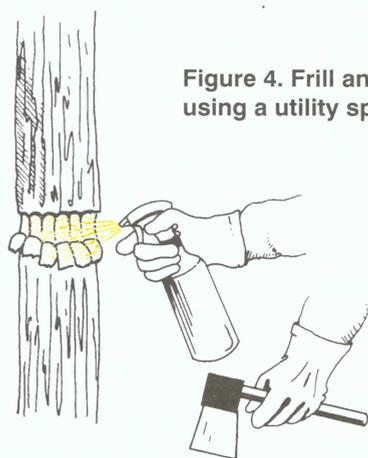
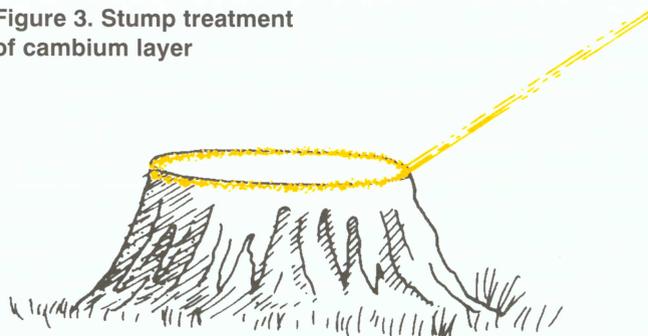


Figure 4. Frill and spray treatment using a utility spray bottle

Frill And Spray. Frilling involves cutting into the sapwood completely around the circumference of the stem at a convenient height. Care is taken to not remove the chips. The frill is then filled or wetted with herbicide solution using a squirt bottle or small spray unit. Frill and spray is different from hack and squirt since the stem is completely girdled with overlapping cuts. Frill and spray delivers a higher dose of herbicide and is more useful on difficult-to-control species.

Fresh-Cut Stump Treatment. Stump treatment is done to retard re-sprouting of severed stems. A backpack sprayer with a wand or gunjet using a straight stream, fan, or hollow cone nozzle is often used. For small numbers of stumps, a utility spray bottle is adequate. For stumps less than 3 inches in diameter, the entire stump is sprayed. On larger

Figure 3. Stump treatment of cambium layer



stumps, it is most important to thoroughly treat the outer 1 inch (cambium) layer. Stumps should be treated no more than 2 hours after cutting. Stump treatment can be done at any time of year.

Hack And Squirt. All that is needed to do "hack and squirt" is a hatchet and a spray bottle. Use the hatchet to wound the tree at intervals encircling the stem, then spray the notch or frill. The interval between hacks will vary with the herbicide used and the species of tree. Hacking is done at a convenient height, usually waist high. Commercial spray bottles that deliver measured doses of herbicide (commonly 1 ml per trigger pull) are available. Hack and squirt can be done at any time of year but is practical only on small areas where a small number of stems will be treated. On large jobs, too much time would be wasted refilling the squirt bottle.

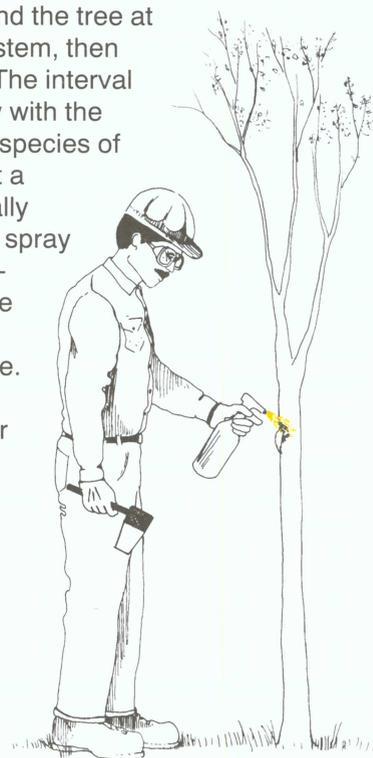


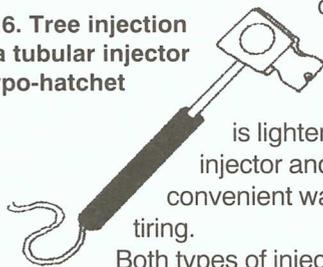
Figure 5. Hack and squirt using a hatchet and spray bottle

Tree Injection. Tree injection is done with a tubular tree injector or hatchet-type injector. It is physically demanding since the applicator must repeatedly strike target stems with a sharp tool to inject herbicide.

Tubular tree injectors are long hollow tubes armed with a chisel-like blade that must be kept sharp. The tube serves as a herbicide reservoir. Upon striking the stem, a handle or wire on the injector is pulled to inject a calibrated dose. A calibration cylinder is provided with injectors, and calibration is varied usually via a lock-nut adjustment.

The hatchet-injector is a hatchet with an internal delivery system so that each time the hatchet strikes the stem, a measured dose is injected automatically.

Figure 6. Tree injection using a tubular injector or a hypo-hatchet



The hatchet-injector delivers 1 ml per strike; this is not adjustable on most models. The hatchet is lighter than the tubular injector and application at convenient waist height is less tiring.

Both types of injectors must be frequently sharpened, washed, flushed, and checked for leaks. Injection is best suited for stems over 6 inches in diameter. Herbicide labels specify the spacing of injections or injections per diameter inch.

Directed Foliar Spray

Directed foliar spraying is an effective growing season treatment as long as care is taken to avoid spraying desirable stems. The growing tips and foliage of unwanted stems are sprayed, usually with a backpack sprayer equipped with a spray wand or gunjet. A full cone, flat fan, or adjustable cone spray tip is used. A wand extension is available for brush over 6 feet tall. Recommended spray pressures are 20-30 psi.

Directed foliar applications are effective after full-leaf in early summer through fall coloration. The label gives proper mixing instructions and will recommend

appropriate wetting agents, penetrants, drift control additives, and dyes. *See illustration on cover.*

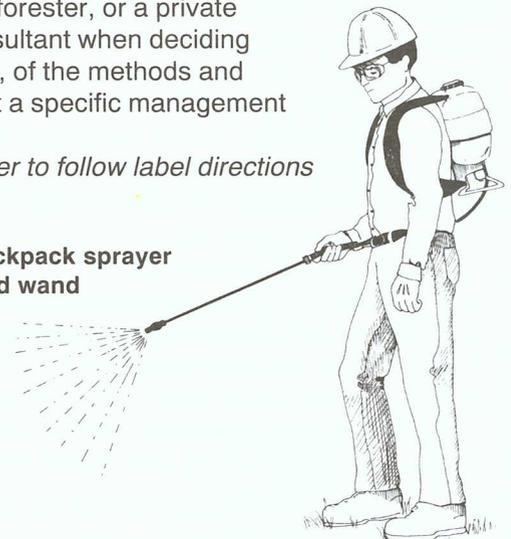
Summary

Individual tree herbicide applications offer forest landowners a “hands-on” option to reach forest management objectives. This publication alerts readers to the many herbicides labeled for this use and discusses application technology options. A more detailed listing of species, timing, and application rates are discussed under “Chemical Weed Control in Forest Stands” in Section 8 of the *North Carolina Agricultural Chemicals Manual*.

Landowners should consult a county Extension agent, a state forest service forester, a commercial forester, or a private forestry consultant when deciding which, if any, of the methods and herbicides fit a specific management regime.

Remember to follow label directions carefully.

Figure 7. Backpack sprayer with standard wand



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Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county Cooperative Extension Service agent.

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